2039

DRINKING WATER SURVEILLANCE PROGRAM

PORT COLBORNE WATER TREATMENT PLANT

ANNUAL REPORT 1990

Environment
Environnement

ISSN 1183-6180

PORT COLBORNE
WATER TREATMENT PLANT

DRINKING WATER SURVEILLANCE PROGRAM

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AUGUST 1992

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PIBS 2039
Log 92-2302-265

EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

PORT COLBORNE WATER TREATMENT PLANT
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 supplies were being monitored.

The Port Colborne water treatment plant is a conventional treatment plant which treats water from Lake Erie. The process consists of coagulation, flocculation, sedimentation, filtration, and disinfection. This plant has a rated capacity of 27.270 x 1000 m^3/day. The Port Colborne water treatment plant serves a population of approximately 15,092.

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Port Colborne water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

93-02440/

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE RAW TESTS	RAW POSITIVE	RAW %POSITIVE	TREATED TESTS	TREATED POSITIVE	TREATED %POSITIVE	SITE 1 TESTS	SITE 1 POSITIVE	SITE 1 %POSITIVE
BACTERIOLOGICAL	27	24	88	8	2	25	9	4	44
CHEMISTRY (FLD)	21	21	100	42	42	100	82	71	86
CHEMISTRY (LAB)	198	161	81	198	145	73	323	281	86
METALS	216	74	34	216	60	27	391	161	41
CHLOROAROMATICS	126	0	0	126	0	0	126	0	0
CHLOROPHENOLS	12	0	0	12	0	0	.	.	.
PAH	134	0	0	134	0	0	15	0	0
PESTICIDES & PCB	307	0	0	307	0	0	191	0	0
PHENOLICS	9	0	0	9	0	0	.	.	.
SPECIFIC PESTICIDES	59	0	0	59	0	0	9	0	0
VOLATILES	261	0	0	232	32	13	261	36	13
TOTAL	1370	280		1343	281		1407	553	

DRINKING WATER SURVEILLANCE PROGRAM

PORT COLBORNE WATER TREATMENT PLANT
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 supplies were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Port Colborne water treatment plant in May of 1990. This is the first published annual report.

PLANT DESCRIPTION

The Port Colborne water treatment plant is a conventional treatment plant which treats water from Lake Erie. The process consists of coagulation, flocculation, sedimentation, filtration, and disinfection. This plant has a rated capacity of 27.270 x 1000 m^3/day. The Port Colborne water treatment plant serves a population of approximately 15,092.

The sample day flows ranged from 11.650 x 1000 m^3/day to 14.600 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were reported above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 5 of 15 treated and distributed water samples with a maximum reported value of 20.0°C.

CHEMISTRY (LAB)

Colour in drinking water may be due to the presence of natural or synthetic substances as well as certain metallic ions.

Colour exceeded the ODWO Maximum Desirable Concentration of 5 HZU in 2 of 18 treated and distributed water samples with a maximum reported value of 13.0 HZU.

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 18 of 18 treated and distributed water samples with a maximum reported value of 135.6 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 16 of 18 treated and distributed water samples with a maximum reported value of 280.0 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the pesticides and PCB scan showed that none were detected.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected above trace levels.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in all 15 treated and distributed water samples analyzed. The maximum observed level was 49.1 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Port Colborne water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1

PORT COLBORNE WTP

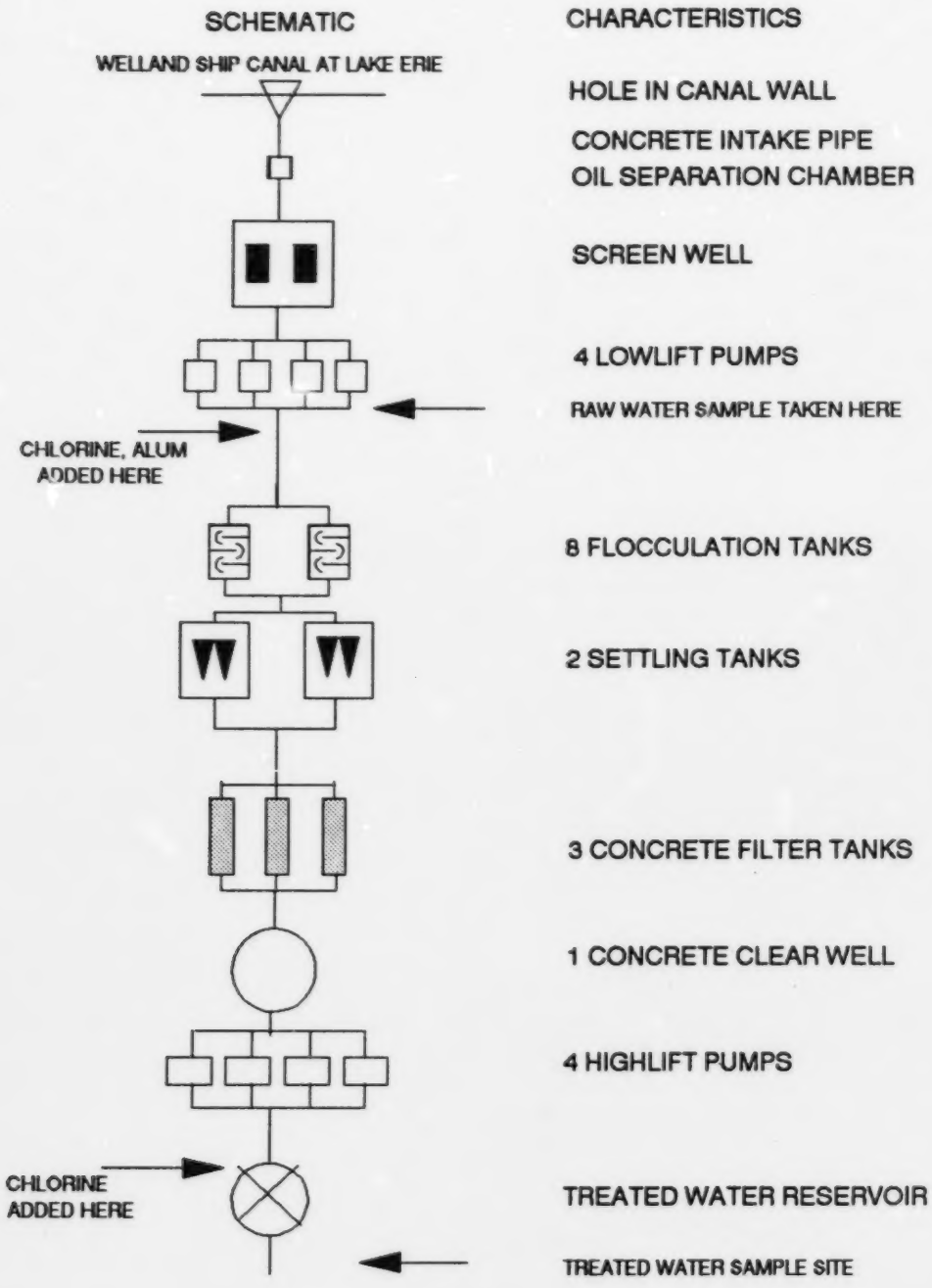

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 220002075
PLANT NAME: PORT COLBORNE WTP

DISTRICT: WELLAND
REGION: WEST CENTRAL
DISTRICT OFFICER :J. MAYES

UTM #: 176428904749130

PLANT SUPERINTENDENT: MR TED BURCH

ADDRESS: 323 KING STREET
PORT COLBORNE,ONTARIO
L3K 4H2
(416 834 3363)

MUNICIPALITY: NIAGARA REGION
AUTHORITY: MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	-	(X 1000 M3)
DESIGN CAPACITY:	36.360	(X 1000 M3/DAY)
RATED CAPACITY:	27.270	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
PORT COLBORNE	15,092

TABLE 2

DRINKING WATER SURVEILLANCE PROGRAM

IN-PLANT MONITORING

PARAMETER:	LOCATION:	FREQUENCY:
CHLORINE RESIDUAL FREE	RAW WATER HEADER	4 HOURS
	SETTLED WATER	4 HOURS
	RESERVOIR	4 HOURS
TURBIDITY	RAW WATER WELL	4 HOURS
	FILTERED WATER	CONTINUOUS
	RESERVOIR	4 HOURS
PH	FINISHED WATER	CONTINUOUS
TEMPERATURE	RAW WATER WELL	CONTINUOUS

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGE (MG/L)		
			PRE CHLORINATION	POST CHLORINATION	COAGULATION
DATE	DELAY * TIME(HRS)	FLOW (1000M3)	CHLORINE	CHLORINE	ALUM LIQUID
MAY 01	.50	13.850	1.03	.35	6.60
MAY 08	.00	.000	1.00	.36	5.80
JUN 05	10.00	.000	1.04	.41	5.80
JUL 10	10.00	14.600	1.31	.34	5.40
AUG 07	6.00	14.510	1.49	.36	5.96
NOV 06	8.00	.000	1.05	.47	8.70
DEC 04	8.00	11.650	.97	.48	6.30

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL									
FECAL COLIFORM MF	9	9	0	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	8	2	0	9	4	0
TOTAL COLIFORM MF	9	6	0	.	.	.	.	.	.
T COLIFORM BCKGRD MF	9	9	0	.	.	.	.	.	.
*TOTAL SCAN BACTERIOLOGICAL	27	24	0	8	2	0	9	4	0
CHEMISTRY (FLD)									
FLD CHLORINE (COMB)	.	.	.	7	7	0	13	11	0
FLD CHLORINE FREE	.	.	.	7	7	0	13	5	0
FLD CHLORINE (TOTAL)	.	.	.	7	7	0	13	12	0
FLD PH	7	7	0	7	7	0	15	15	0
FLD TEMPERATURE	7	7	0	7	7	0	15	15	0
FLD TURBIDITY	7	7	0	7	7	0	13	13	0
*TOTAL SCAN CHEMISTRY (FLD)	21	21	0	42	42	0	82	71	0
CHEMISTRY (LAB)									
ALKALINITY	9	9	0	9	9	0	17	17	0
CALCIUM	9	9	0	9	9	0	17	17	0
CYANIDE	9	0	0	9	0	0	.	.	.
CHLORIDE	9	9	0	9	9	0	17	17	0
COLOUR	9	2	7	9	1	8	17	2	15
CONDUCTIVITY	9	9	0	9	9	0	17	17	0
DISS ORG CARBON	9	9	0	9	9	0	17	17	0
FLUORIDE	9	9	0	9	9	0	17	17	0
HARDNESS	9	9	0	9	9	0	17	17	0
IONCAL	9	9	0	9	9	0	17	17	0
LANGELIERS INDEX	9	9	0	9	9	0	17	17	0
MAGNESIUM	9	9	0	9	9	0	17	17	0
SODIUM	9	9	0	9	9	0	17	17	0
AMMONIUM TOTAL	9	4	1	9	1	3	17	4	8
NITRITE	9	5	4	9	2	3	17	4	10
TOTAL NITRATES	9	9	0	9	9	0	17	17	0
NITROGEN TOT KJELD	9	9	0	9	9	0	17	17	0
PH	9	9	0	9	9	0	17	17	0
PHOSPHORUS FIL REACT	9	1	4	9	0	3	.	.	.
PHOSPHORUS TOTAL	9	5	3	9	1	6	.	.	.
SULPHATE	9	9	0	9	9	0	17	17	0
TURBIDITY	9	9	0	9	5	4	17	16	1
*TOTAL SCAN CHEMISTRY (LAB)	198	161	19	198	145	27	323	281	34

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS									
SILVER	9	0	0	9	0	0	17	0	0
ALUMINUM	9	9	0	9	9	0	17	17	0
ARSENIC	9	0	9	9	0	9	17	0	17
BARIUM	9	9	0	9	9	0	17	17	0
BORON	9	9	0	9	9	0	17	16	1
BERYLLIUM	9	0	1	9	0	1	17	0	0
CADMIUM	9	0	0	9	0	0	17	0	11
COBALT	9	0	9	9	0	9	17	1	15
CHROMIUM	9	0	6	9	0	7	17	0	12
COPPER	9	0	9	9	0	9	17	8	9
IRON	9	5	4	9	0	4	17	1	16
MERCURY	9	0	4	9	1	0	.	.	.
MANGANESE	9	9	0	9	6	3	17	17	0
MOLYBDENUM	9	9	0	9	9	0	17	17	0
NICKEL	9	1	8	9	1	7	17	2	15
LEAD	9	0	9	9	0	9	17	14	3
ANTIMONY	9	3	6	9	2	7	17	12	5
SELENIUM	9	0	2	9	0	4	17	0	9
STRONTIUM	9	9	0	9	9	0	17	17	0
TITANIUM	9	5	4	9	2	7	17	5	12
THALLIUM	9	0	0	9	0	0	17	0	0
URANIUM	9	0	9	9	0	9	17	0	17
VANADIUM	9	0	9	9	0	9	17	0	17
ZINC	9	6	3	9	3	6	17	17	0
*TOTAL SCAN METALS	216	74	92	216	60	100	391	161	159
*TOTAL GROUP INORGANIC & PHYSICAL	435	256	111	456	247	127	796	513	193
CHLOROAROMATICS									
HEXACHLOROBUTADIENE	9	0	0	9	0	0	9	0	0
123 TRICHLOROBENZENE	9	0	0	9	0	0	9	0	0
1234 T-CHLOROBENZENE	9	0	0	9	0	0	9	0	0
1235 T-CHLOROBENZENE	9	0	0	9	0	0	9	0	0
124 TRICHLOROBENZENE	9	0	0	9	0	0	9	0	0
1245 T-CHLOROBENZENE	9	0	0	9	0	0	9	0	0
135 TRICHLOROBENZENE	9	0	0	9	0	0	9	0	0
HCB	9	0	0	9	0	0	9	0	0
HEXACHLOROETHANE	9	0	0	9	0	0	9	0	0
OCTACHLOROSTYRENE	9	0	0	9	0	0	9	0	0
PENTACHLOROBENZENE	9	0	0	9	0	0	9	0	0
236 TRICHLOROTOLUENE	9	0	0	9	0	0	9	0	0
245 TRICHLOROTOLUENE	9	0	0	9	0	0	9	0	0
26A TRICHLOROTOLUENE	9	0	0	9	0	0	9	0	0
*TOTAL SCAN CHLOROAROMATICS	126	0	0	126	0	0	126	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
CHLOROPHENOLS									
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0
PAH									
PHENANTHRENE	8	0	0	8	0	0	1	0	0
ANTHRACENE	7	0	0	7	0	0	0	0	0
FLUORANTHENE	8	0	0	8	0	0	1	0	0
PYRENE	8	0	0	8	0	0	1	0	0
BENZO(A)ANTHRACENE	8	0	0	8	0	0	1	0	0
CHRYSENE	8	0	0	8	0	0	1	0	0
DIMETH. BENZ(A)ANTHR	7	0	0	7	0	0	0	0	0
BENZO(E) PYRENE	8	0	0	8	0	0	1	0	0
BENZO(B) FLUORANTHEN	8	0	0	8	0	0	1	0	0
PERYLENE	8	0	0	8	0	0	1	0	0
BENZO(K) FLUORANTHEN	8	0	0	8	0	0	1	0	0
BENZO(A) PYRENE	8	0	0	8	0	0	1	0	0
BENZO(G,H,I) PERYLEN	8	0	0	8	0	0	1	0	0
DIBENZO(A,H) ANTHRAC	8	0	0	8	0	0	1	0	0
INDENO(1,2,3-C,D) PY	8	0	0	8	0	0	1	0	0
BENZO(B) CHRYSENE	8	0	0	8	0	0	1	0	0
CORONENE	8	0	0	8	0	0	1	0	0
*TOTAL SCAN PAH	134	0	0	134	0	0	15	0	0
PESTICIDES & PCB									
ALDRIN	9	0	0	9	0	0	9	0	0
ALPHA BHC	9	0	5	9	0	6	9	0	6
BETA BHC	9	0	0	9	0	0	9	0	0
LINDANE	9	0	0	9	0	0	9	0	0
ALPHA CHLORDANE	9	0	0	9	0	0	9	0	0
GAMMA CHLORDANE	9	0	0	9	0	0	9	0	0
DIELDRIN	9	0	0	9	0	0	9	0	0
METHOXYCHLOR	9	0	0	9	0	0	9	0	0
ENDOSULFAN 1	9	0	0	9	0	0	9	0	0
ENDOSULFAN II	9	0	0	9	0	0	9	0	0
ENDRIN	9	0	0	9	0	0	9	0	0
ENDOSULFAN SULPHATE	9	0	0	9	0	0	9	0	0
HEPTACHLOR EPOXIDE	9	0	0	9	0	0	9	0	0
HEPTACHLOR	9	0	0	9	0	0	9	0	0
MIREX	9	0	0	9	0	0	9	0	0
OXYCHLORDANE	9	0	0	9	0	0	9	0	0
OPDDT	9	0	0	9	0	0	9	0	0
PCB	9	0	0	9	0	0	9	0	0
DDD	9	0	0	9	0	0	9	0	0
PPDDE	9	0	0	9	0	0	9	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	9	0	0	9	0	0	9	0	0
AMETRINE	9	0	0	9	0	0	.	.	.
ATRAZINE	9	0	5	9	0	2	.	.	.
ATRATONE	9	0	0	9	0	0	.	.	.
CYANAZINE (BLADEX)	9	0	0	9	0	0	.	.	.
DESETHYLATRAZINE	9	0	0	9	0	0	.	.	.
D-ETHYL SIMAZINE	8	0	0	8	0	0	.	.	.
PROMETONE	9	0	0	9	0	0	.	.	.
PROPAZINE	9	0	0	9	0	0	.	.	.
PROMETRYNE	9	0	0	9	0	0	.	.	.
METRIBUZIN (SENCOR)	9	0	0	9	0	0	.	.	.
SIMAZINE	9	0	0	9	0	0	.	.	.
ALACHLOR (LASSO)	9	0	0	9	0	0	.	.	.
METOLACHLOR	9	0	0	9	0	0	.	.	.
HEXACLCYCLOPENTADIEN	2	0	0	2	0	0	2	0	0
*TOTAL SCAN PESTICIDES & PCB	307	0	10	307	0	8	191	0	6
PHENOLICS									
PHENOLICS	9	0	2	9	0	4	.	.	.
*TOTAL SCAN PHENOLICS	9	0	2	9	0	4	0	0	0
SPECIFIC PESTICIDES									
TOXAPHENE	9	0	0	9	0	0	9	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.
2,4-D	2	0	0	2	0	0	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.
DICAMBA	1	0	0	1	0	0	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.
ETHION	2	0	0	2	0	0	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.
PHORATE	1	0	0	1	0	0	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.
BENOMYL	0	0	0	0	0	0	.	.	.
BUX	0	0	0	0	0	0	.	.	.
CARBOFURAN	2	0	0	2	0	0	.	.	.
CICP	2	0	0	2	0	0	.	.	.
DIALLATE	2	0	0	2	0	0	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	2	0	0	2	0	0	.	.	.
IPC	2	0	0	2	0	0	.	.	.
PROPOXUR	2	0	0	2	0	0	.	.	.
CARBARYL	2	0	0	2	0	0	.	.	.
BUTYLATE	2	0	0	2	0	0	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	59	0	0	59	0	0	9	0	0
VOLATILES									
BENZENE	9	0	0	8	0	5	9	0	5
TOLUENE	9	0	0	8	0	6	9	0	5
ETHYLBENZENE	9	0	1	8	0	7	9	0	5
P-XYLENE	9	0	0	8	0	0	9	0	0
M-XYLENE	9	0	0	8	0	5	9	0	2
O-XYLENE	9	0	0	8	0	4	9	0	3
STYRENE	9	0	1	8	0	5	9	0	5
1,1 DICHLOROETHYLENE	9	0	0	8	0	0	9	0	0
METHYLENE CHLORIDE	9	0	0	8	0	0	9	0	0
T1,2DICHLOROETHYLENE	9	0	0	8	0	0	9	0	0
1,1 DICHLOROETHANE	9	0	0	8	0	0	9	0	0
CHLOROFORM	9	0	0	8	8	0	9	9	0
111, TRICHLOROETHANE	9	0	0	8	0	0	9	0	0
1,2 DICHLOROETHANE	9	0	0	8	0	0	9	0	0
CARBON TETRACHLORIDE	9	0	0	8	0	0	9	0	0
1,2 DICHLOROPROPANE	9	0	0	8	0	0	9	0	0
TRICHLOROETHYLENE	9	0	0	8	0	0	9	0	0
DICHLOROBROMOMETHANE	9	0	0	8	8	0	9	9	0
112 TRICHLOROETHANE	9	0	0	8	0	0	9	0	0
CHLORODIBROMOMETHANE	9	0	0	8	8	0	9	9	0
T-CHLOROETHYLENE	9	0	0	8	0	0	9	0	0
BROMOFORM	9	0	0	8	0	8	9	0	9
1122 T-CHLOROETHANE	9	0	0	8	0	0	9	0	0
CHLOROBENZENE	9	0	0	8	0	0	9	0	0
1,4 DICHLOROBENZENE	9	0	0	8	0	0	9	0	0
1,3 DICHLOROBENZENE	9	0	0	8	0	0	9	0	0
1,2 DICHLOROBENZENE	9	0	0	8	0	0	9	0	0
ETHLYENE DIBROMIDE	9	0	0	8	0	0	9	0	0
TOTL TRIHALOMETHANES	9	0	0	8	8	0	9	9	0
*TOTAL SCAN VOLATILES	261	0	2	232	32	40	261	36	34
*TOTAL GROUP ORGANIC	908	0	14	879	32	52	602	36	40

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR		Unreliable: Could Not Confirm By Reanalysis
UCS		Unreliable: Contamination Suspected
UIH		Unreliable: Indeterminate Interference
XP		Positive After X Number Of Hours
T#	(T06)	Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
BACTERIOLOGICAL				
FECAL COLIFORM MF (CT/100ML)			**DET'N LIMIT = 0**	**GUIDELINE = 0 (A1)**
MAY	34	.	.	.
JUN	118	.	.	.
JUL	72	.	.	.
AUG	2	.	.	.
SEP	16	.	.	.
OCT	20	.	.	.
NOV	24	.	.	.
DEC	28	.	.	.
STANDRD PLATE CNT MF (COUNT/ML)			**DET'N LIMIT = 0**	**GUIDELINE = 500/ML (A3)**
MAY	.	0 <=>	.	1 <=>
JUN	.	1 <=>	.	48
JUL	.	0 <=>	.	2 <=>
AUG	.	2 <=>	.	39
SEP	.	21	.	106
OCT	.	12	.	3 <=>
NOV	.	3 <=>	.	6 <=>
DEC	.	!LA	.	138
TOTAL COLIFORM MF (CT/100ML)			**DET'N LIMIT = 0**	**GUIDELINE = 5/100ML(A1)**
MAY	70	.	.	.
JUN	2600	.	.	.
JUL	8900	.	.	.
AUG	40 <=>	.	.	.
SEP	BDL	.	.	.
OCT	250	.	.	.
NOV	310	.	.	.
DEC	200	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)			**DET'N LIMIT = 0**	**GUIDELINE = N/A**
MAY	763	.	.	.
JUN	50000	.	.	.
JUL	40000 >	.	.	.
AUG	7000	.	.	.
SEP	24000 >	.	.	.
OCT	14000	.	.	.
NOV	5300	.	.	.
DEC	3000	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CHEMISTRY (FLD)				
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
MAY	.	.100	.	.200
JUN	.	.250	.000	.200
JUL	.	.200	.050	.100
AUG	.	.200	.000	.100
OCT	.	.	.100	.100
NOV	.	.160	.100	.150
DEC	.	.170	.	.350
FLD CHLORINE FREE (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
MAY	.	.400	.	.100
JUN	.	.300	.000	.100
JUL	.	.300	.000	.000
AUG	.	.300	.000	.000
OCT	.	.	.000	.100
NOV	.	.310	.000	.000
DEC	.	.370	.	.100
FLD CHLORINE (TOTAL) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
MAY	.	.500	.	.300
JUN	.	.550	.050	.300
JUL	.	.500	.050	.100
AUG	.	.500	.000	.100
OCT	.	.	.100	.200
NOV	.	.470	.100	.150
DEC	.	.540	.	.250
FLD PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)
MAY	8.400	8.100	7.600	7.500
JUN	8.100	7.700	7.600	7.500
JUL	8.400	7.600	7.700	7.500
AUG	8.200	7.600	7.700	7.500
OCT	.	.	7.500	7.500
NOV	8.300	7.900	7.500	7.500
DEC	8.400	7.600	7.700	7.500
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A	GUIDELINE = 15 (A3)
MAY	10.000	10.000	11.500	7.500
JUN	13.000	12.500	12.500	10.000
JUL	19.800	20.000	17.000	16.000
AUG	20.000	20.000	20.000	19.000
OCT	.	.	16.500	17.000
NOV	12.000	10.500	15.500	10.000
DEC	7.000	5.500	12.000	5.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1 (A1)
MAY	1.100	.150	.190	.220
JUN	4.200	.260	.340	.250
JUL	2.600	.110	.220	.
AUG	3.300	.180	.190	.200
OCT	.	.	.210	.130
NOV	2.000	.140	.300	.300
DEC	5.500	.150	.	.220

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CHEMISTRY (LAB)				
ALKALINITY (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A3)
MAY	102.100	97.700	99.500	98.300
JUN	98.100	95.000	95.300	96.400
JUL	96.000	91.900	92.700	92.900
AUG	97.900	93.000	91.500	91.500
SEP	94.900	90.700	91.000	91.100
OCT	97.000	92.100	93.500	93.500
NOV	103.000	100.100	99.700	98.700
DEC	105.000	101.100	100.900	102.200
CALCIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 100 (F2)
MAY	37.700	38.100	37.200	37.500
JUN	37.200	36.200	37.400	37.200
JUL	36.400	36.200	35.800	37.000
AUG	36.500	36.900	36.200	37.300
SEP	35.400	35.000	35.200	35.000
OCT	37.400	37.800	38.000	37.600
NOV	38.100	38.900	38.900	37.600
DEC	39.000	37.900	38.900	37.800
CHLORIDE (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 250 (A3)
MAY	15.400	16.500	16.700	16.500
JUN	15.800	16.800	17.000	16.800
JUL	15.600	17.300	17.500	17.200
AUG	15.700	17.700	17.900	17.900
SEP	14.900	16.600	17.400	16.700
OCT	15.100	16.800	16.800	16.500
NOV	14.800	15.100	15.700	15.600
DEC	16.000	17.200	17.900	16.800
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)
MAY	2.000 <T	1.000 <T	2.000 <T	1.500 <T
JUN	1.500 <T	13.000	2.000 <T	1.500 <T
JUL	1.500 <T	.500 <T	.500 <T	1.000 <T
AUG	2.000 <T	1.000 <T	1.500 <T	1.500 <T
SEP	1.000 <T	1.000 <T	1.000 <T	1.500 <T
OCT	1.000 <T	1.000 <T	1.000 <T	1.000 <T
NOV	2.000 <T	1.000 <T	3.000	8.500
DEC	2.500	1.500 <T	2.000 <T	2.000 <T
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)
MAY	303	303	307	304
JUN	291	294	297	298
JUL	291	294	296	294
AUG	291	294	289	288
SEP	282	285	286	285
OCT	294	296	299	296
NOV	303	309	308	305
DEC	307	314	316	313

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
DISS ORG CARBON (MG/L)			**DET'N LIMIT = .100**	**GUIDELINE = 5.0 (A3)**
MAY	2.000	2.000	2.200	2.000
JUN	2.300	2.200	2.300	2.300
JUL	2.000	2.000	2.200	1.900
AUG	2.000	1.900	1.900	1.800
SEP	1.900	1.800	2.100	1.800
OCT	1.700	1.600	1.800	1.500
NOV	1.500	1.300	1.400	1.200
DEC	1.900	1.800	2.000	1.800
FLUORIDE (MG/L)			**DET'N LIMIT = 0.01**	**GUIDELINE = 2.4 (A1)**
MAY	.100	.080	.120	.120
JUN	.120	.120	.120	.120
JUL	.120	.120	.120	.120
AUG	.140	.120	.120	.100
SEP	.100	.100	.100	.100
OCT	.120	.120	.120	.120
NOV	.120	.120	.120	.120
DEC	.100	.100	.100	.100
HARDNESS (MG/L)			**DET'N LIMIT = 0.5**	**GUIDELINE = 80-100 (A4)**
MAY	129.300	130.200	128.800	129.200
JUN	127.900	126.400	129.700	129.200
JUL	128.000	126.000	125.000	128.000
AUG	129.000	130.600	129.000	130.900
SEP	123.000	122.000	121.000	121.000
OCT	130.000	132.000	132.000	131.000
NOV	133.100	135.600	134.900	132.100
DEC	135.700	132.800	135.300	133.300
IONCAL (DMNSLESS)			**DET'N LIMIT = N/A**	**GUIDELINE = N/A**
MAY	2.315	.243	2.584	1.382
JUN	.124	1.056	.366	.967
JUL	.855	.345	2.342	.023
AUG	1.330	2.446	1.964	3.484
SEP	.596	.730	2.312	1.014
OCT	4.559	4.752	4.056	4.018
NOV	.506	1.994	.615	.457
DEC	1.481	.467	.540	.220
LANGELIERS INDEX (DMNSLESS)			**DET'N LIMIT = N/A**	**GUIDELINE = N/A**
MAY	.515	.421	.427	.426
JUN	.437	.240	.294	.266
JUL	.438	.375	.333	.420
AUG	.518	.449	.295	.339
SEP	.424	.308	.302	.330
OCT	.443	.344	.392	.419
NOV	.494	.458	.467	.449
DEC	.450	.351	.321	.344

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
MAGNESIUM (MG/L)			DET'N LIMIT = 0.1	GUIDELINE = 30 (F2)
MAY	8.550	8.550	8.700	8.650
JUN	8.500	8.750	8.800	8.800
JUL	8.900	8.700	8.700	8.600
AUG	9.150	9.350	9.400	9.200
SEP	8.400	8.300	8.100	8.300
OCT	9.000	9.100	8.900	9.000
NOV	9.250	9.350	9.150	9.250
DEC	9.300	9.300	9.300	9.500
SODIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 200 (A4)
MAY	8.900	9.800	9.500	9.300
JUN	9.200	9.300	9.300	8.800
JUL	8.600	8.800	8.600	8.600
AUG	8.700	8.900	8.700	9.000
SEP	8.800	8.800	8.600	8.800
OCT	9.400	9.600	9.800	9.800
NOV	8.200	8.300	8.100	8.700
DEC	9.900	10.000	10.400	10.200
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)
MAY	.004 <T	BDL	.006 <T	BDL
JUN	BDL	BDL	BDL	BDL
JUL	.010	BDL	.026	.002 <T
AUG	.026	.002 <T	.008 <T	.004 <T
SEP	BDL	BDL	.050	BDL
OCT	.018	.002 <T	.008 <T	.002 <T
NOV	BDL	BDL	.006 <T	BDL
DEC	BDL	.004 <T	.030	.004 <T
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1 (A1)
MAY	.004 <T	.001 <T	.003 <T	.004 <T
JUN	.003 <T	BDL	.001 <T	BDL
JUL	.009	.005	.008	.006
AUG	.005	.001 <T	.002 <T	.002 <T
SEP	.007	.005	.003 <T	.006
OCT	.005	BDL	.002 <T	BDL
NOV	.004 <T	BDL	.002 <T	.001 <T
DEC	.007	.004 <T	.005	.003 <T
TOTAL NITRATES (MG/L)			DET'N LIMIT = 0.005	GUIDELINE = 10 (A1)
MAY	.275	.275	.280	.275
JUN	.225	.235	.240	.245
JUL	.275	.280	.285	.270
AUG	.200	.190	.205	.200
SEP	.175	.145	.150	.145
OCT	.165	.165	.170	.170
NOV	.290	.305	.305	.300
DEC	.320	.385	.380	.365

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
NITROGEN TOT KJELD (MG/L)			**DET'N LIMIT = 0.02**	**GUIDELINE = N/A**
MAY	.240	.190	.300	.200
JUN	.240	.170	.220	.170
JUL	.250	.170	.440	.170
AUG	.240	.170	.260	.160
SEP	.190	.150	.300	.130
OCT	.510	.540	.520	.510
NOV	.210	.180	.240	.160
DEC	.170	.120	.290	.120
PH (DMNSLESS)			**DET'N LIMIT = N/A**	**GUIDELINE = 6.5-8.5(A4)**
MAY	8.370	8.290	8.300	8.300
JUN	8.310	8.140	8.180	8.150
JUL	8.330	8.290	8.250	8.320
AUG	8.400	8.350	8.210	8.240
SEP	8.330	8.240	8.230	8.260
OCT	8.320	8.240	8.280	8.310
NOV	8.340	8.310	8.320	8.320
DEC	8.280	8.210	8.170	8.200
PHOSPHORUS FIL REACT (MG/L)			**DET'N LIMIT = 0.0005**	**GUIDELINE = N/A**
MAY	.000	.000	.	.
JUN	.000 <T	BDL	.	.
JUL	BDL	BDL	.	.
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	.
OCT	.000 <T	BDL	.	.
NOV	.002 <T	.001 <T	.	.
DEC	.002	.000 <T	.	.
PHOSPHORUS TOTAL (MG/L)			**DET'N LIMIT = 0.002**	**GUIDELINE = .40 (F2)**
MAY	.006 <T	.003 <T	.	.
JUN	.011	BDL	.	.
JUL	.019	.004 <T	.	.
AUG	.019	.005 <T	.	.
SEP	.009 <T	.003 <T	.	.
OCT	BDL	.002 <T	.	.
NOV	.076	.066	.	.
DEC	.020	.003 <T	.	.
SULPHATE (MG/L)			**DET'N LIMIT = .200**	**GUIDELINE = 500 (A3)**
MAY	26.150	28.070	27.940	27.740
JUN	25.370	27.450	27.930	27.510
JUL	24.910	27.320	27.740	27.120
AUG	24.010	26.560	26.530	26.870
SEP	23.650	25.940	26.120	25.800
OCT	24.370	28.170	27.860	27.750
NOV	24.270	26.970	27.340	27.200
DEC	25.070	27.460	28.540	27.620

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1		
			STANDING	FREE FLOW	
TURBIDITY (FTU)			DET'N LIMIT = 0.05	GUIDELINE = 1	(A1)
MAY	1.600	.370	.760	.590	
JUN	6.100	.580	.630	.580	
JUL	6.200	.230 <T	.550	.260	
AUG	4.800	.230 <T	.480	.300	
SEP	2.100	.270	.370	.260	
OCT	1.400	.240 <T	.370	.210 <T	
NOV	4.500	.220 <T	.600	.370	
DEC	6.500	.570	.720	.610	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
METALS				
ALUMINUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)
MAY	25.000	180.000	170.000	170.000
JUN	78.000	220.000	170.000	170.000
JUL	65.000	220.000	170.000	200.000
AUG	48.000	270.000	220.000	250.000
SEP	29.000	280.000	200.000	270.000
OCT	25.000	170.000	160.000	160.000
NOV	50.000	120.000	120.000	130.000
DEC	71.000	83.000	80.000	76.000
ARSENIC (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)
MAY	.640 <T	.390 <T	.320 <T	.440 <T
JUN	.420 <T	.320 <T	.170 <T	.130 <T
JUL	.830 <T	.520 <T	.350 <T	.310 <T
AUG	.960 <T	.510 <T	.500 <T	.720 <T
SEP	.590 <T	.120 <T	.330 <T	.250 <T
OCT	.810 <T	.570 <T	.590 <T	.560 <T
NOV	.730 <T	.470 <T	.370 <T	.300 <T
DEC	.650 <T	.180 <T	.140 <T	.110 <T
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)
MAY	21.000	21.000	21.000	21.000
JUN	22.000	21.000	21.000	21.000
JUL	21.000	20.000	20.000	19.000
AUG	22.000	21.000	21.000	22.000
SEP	21.000	21.000	20.000	21.000
OCT	25.000	24.000	24.000	24.000
NOV	20.000	20.000	20.000	20.000
DEC	21.000	21.000	21.000	21.000
BORON (UG/L)			DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)
MAY	53.000	53.000	57.000	59.000
JUN	23.000	24.000	24.000	24.000
JUL	21.000	25.000	30.000	24.000
AUG	38.000	39.000	37.000	37.000
SEP	31.000	30.000	28.000	26.000
OCT	24.000	23.000	25.000	23.000
NOV	25.000	25.000	27.000	19.000 <T
DEC	21.000	23.000	23.000	23.000
BERYLLIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 6800 (D4)
MAY	BDL	.060 <T	BDL	BDL
JUN	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CADMIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
MAY	BDL	BDL	.150 <T	.060 <T
JUN	BDL	BDL	.250 <T	BDL
JUL	BDL	BDL	.250 <T	BDL
AUG	BDL	BDL	.130 <T	.090 <T
SEP	BDL	BDL	.340 <T	BDL
OCT	BDL	BDL	.220 <T	BDL
NOV	BDL	BDL	.280 <T	BDL
DEC	BDL	BDL	.260 <T	.110 <T
COBALT (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A
MAY	.110 <T	.190 <T	.140 <T	.240 <T
JUN	.220 <T	.130 <T	.130 <T	.100 <T
JUL	.130 <T	.110 <T	.100 <T	.120 <T
AUG	.070 <T	.050 <T	BDL	.110 <T
SEP	.050 <T	.050 <T	.100 <T	.090 <T
OCT	.090 <T	.060 <T	.090 <T	.070 <T
NOV	.070 <T	.030 <T	.030 <T	.100 <T
DEC	.230 <T	.140 <T	.120 <T	.130 <T
CHROMIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)
MAY	2.100 <T	2.200 <T	2.400 <T	2.500 <T
JUN	BDL	.670 <T	.560 <T	.590 <T
JUL	.570 <T	1.600 <T	1.000 <T	1.300 <T
AUG	2.700 <T	3.200 <T	2.600 <T	2.700 <T
SEP	1.800 <T	1.800 <T	1.200 <T	.950 <T
OCT	BDL	BDL	BDL	BDL
NOV	1.800 <T	1.800 <T	1.800 <T	BDL
DEC	BDL	BDL	BDL	BDL
COPPER (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 1000 (A3)
MAY	1.300 <T	1.200 <T	7.600	1.500 <T
JUN	1.500 <T	1.400 <T	8.200	2.000 <T
JUL	1.500 <T	1.300 <T	8.700	1.800 <T
AUG	1.800 <T	1.100 <T	14.000	1.600 <T
SEP	1.400 <T	1.500 <T	9.200	1.700 <T
OCT	1.200 <T	1.100 <T	5.500	1.200 <T
NOV	1.100 <T	.980 <T	16.000	2.800 <T
DEC	1.500 <T	1.000 <T	10.000	3.700 <T
IRON (UG/L)			DET'N LIMIT = 6.00	GUIDELINE = 300 (A3)
MAY	28.000 <T	12.000 <T	61.000	39.000 <T
JUN	110.000	12.000 <T	50.000 <T	29.000 <T
JUL	110.000	BDL	19.000 <T	25.000 <T
AUG	87.000	BDL	51.000 <T	40.000 <T
SEP	51.000 <T	14.000 <T	57.000 <T	26.000 <T
OCT	43.000 <T	BDL	34.000 <T	17.000 <T
NOV	82.000	BDL	57.000 <T	52.000 <T
DEC	110.000	8.400 <T	29.000 <T	46.000 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
MERCURY (UG/L)			**DET'N LIMIT = 0.02**	**GUIDELINE = 1 (A1)**
MAY	BDL	BDL	.	.
JUN	BDL	BDL	.	.
JUL	.030 <T	BDL	.	.
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	.
OCT	.060 <T	.120	.	.
NOV	.100 <T	BDL	.	.
DEC	.060 <T	BDL	.	.
MANGANESE (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 50 (A3)**
MAY	2.700	.620	5.900	3.100
JUN	8.300	.900	4.500	3.000
JUL	8.200	.660	3.100	4.900
AUG	6.500	.690	4.500	3.700
SEP	5.200	.660	5.100	3.300
OCT	3.900	.390 <T	4.000	2.900
NOV	4.700	.370 <T	3.100	2.800
DEC	6.100	.290 <T	4.200	8.600
MOLYBDENUM (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = N/A**
MAY	1.100	1.200	1.200	1.300
JUN	.980	1.200	1.200	1.400
JUL	1.000	1.100	1.000	1.100
AUG	1.000	1.200	1.100	1.300
SEP	1.100	1.200	1.300	1.200
OCT	1.300	1.400	1.400	1.300
NOV	1.000	1.100	1.200	1.100
DEC	.960	1.200	1.200	1.200
NICKEL (UG/L)			**DET'N LIMIT = 0.20**	**GUIDELINE = 350 (D3)**
MAY	.960 <T	.900 <T	2.200	.740 <T
JUN	.710 <T	BDL	.730 <T	.260 <T
JUL	.790 <T	.780 <T	1.200 <T	.440 <T
AUG	1.700 <T	1.200 <T	1.600 <T	1.300 <T
SEP	.350 <T	.400 <T	.800 <T	.250 <T
OCT	2.300	2.100	2.600	2.000 <T
NOV	.810 <T	.400 <T	.710 <T	.720 <T
DEC	1.200 <T	1.100 <T	1.300 <T	1.200 <T
LEAD (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 10. (A1)**
MAY	.280 <T	.110 <T	2.100	.360 <T
JUN	.300 <T	.140 <T	2.000	.520
JUL	.330 <T	.230 <T	1.500	.620
AUG	.330 <T	.130 <T	2.200	.680
SEP	.300 <T	.250 <T	2.500	.750
OCT	.230 <T	.150 <T	2.100	.720
NOV	.270 <T	.110 <T	3.400	.510
DEC	.270 <T	.330 <T	1.700	.300 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
ANTIMONY (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 146 (D4)
MAY	.580	.410 <T	.540	.640
JUN	.540	.560	.520	.640
JUL	.430 <T	.430 <T	.530	.430 <T
AUG	.550	.650	.680	.690
SEP	.370 <T	.290 <T	.630	.500 <T
OCT	.490 <T	.430 <T	.650	.600
NOV	.450 <T	.490 <T	.500 <T	.610
DEC	.400 <T	.500 <T	.410 <T	.500 <T
SELENIUM (UG/L)			DET'N LIMIT = 1.00	GUIDELINE = 10 (A1)
MAY	1.300 <T	1.200 <T	1.100 <T	1.500 <T
JUN	2.000 <T	1.400 <T	BDL	1.200 <T
JUL	BDL	BDL	BDL	1.700 <T
AUG	BDL	1.600 <T	BDL	1.900 <T
SEP	BDL	1.100 <T	1.600 <T	1.100 <T
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	1.200 <T	BDL
DEC	BDL	BDL	BDL	BDL
STRONTIUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = N/A
MAY	190.000	190.000	190.000	190.000
JUN	190.000	190.000	190.000	190.000
JUL	160.000	150.000	160.000	160.000
AUG	170.000	170.000	170.000	170.000
SEP	170.000	170.000	160.000	160.000
OCT	190.000	190.000	190.000	190.000
NOV	150.000	160.000	160.000	160.000
DEC	180.000	190.000	190.000	190.000
TITANIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = N/A
MAY	7.600	7.300	7.000	7.500
JUN	6.400	4.900 <T	5.500	4.800 <T
JUL	6.600	4.300 <T	5.200	4.600 <T
AUG	4.400 <T	3.000 <T	2.900 <T	3.100 <T
SEP	3.800 <T	2.800 <T	2.900 <T	2.700 <T
OCT	2.600 <T	1.800 <T	1.900 <T	1.900 <T
NOV	3.700 <T	2.300 <T	2.200 <T	2.300 <T
DEC	5.900	2.800 <T	2.700 <T	2.700 <T
URANIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (A1)
MAY	.350 <T	.350 <T	.430 <T	.360 <T
JUN	.310 <T	.300 <T	.330 <T	.320 <T
JUL	.310 <T	.300 <T	.260 <T	.300 <T
AUG	.310 <T	.320 <T	.320 <T	.350 <T
SEP	.330 <T	.350 <T	.250 <T	.290 <T
OCT	.380 <T	.390 <T	.370 <T	.390 <T
NOV	.370 <T	.340 <T	.330 <T	.340 <T
DEC	.370 <T	.360 <T	.340 <T	.340 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
VANADIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A
MAY	.190 <T	.310 <T	.340 <T	.350 <T
JUN	.270 <T	.300 <T	.310 <T	.280 <T
JUL	.310 <T	.460 <T	.370 <T	.380 <T
AUG	.300 <T	.420 <T	.370 <T	.430 <T
SEP	.190 <T	.350 <T	.330 <T	.350 <T
OCT	.310 <T	.450 <T	.380 <T	.390 <T
NOV	.250 <T	.300 <T	.280 <T	.340 <T
DEC	.260 <T	.320 <T	.220 <T	.200 <T
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)
MAY	2.000 <T	1.400 <T	53.000	7.700
JUN	2.900	1.900 <T	92.000	13.000
JUL	2.800	1.500 <T	77.000	14.000
AUG	2.600	2.200	61.000	12.000
SEP	2.500	2.500	110.000	16.000
OCT	1.700 <T	1.200 <T	65.000	11.000
NOV	3.000	1.800 <T	140.000	14.000
DEC	2.700	2.100	69.000	18.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
PESTICIDES & PCB				
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700 (G)
MAY	1.000 <T	2.000 <T	.	1.000 <T
JUN	BDL	BDL	.	1.000 <T
JUL	BDL	1.000 <T	.	BDL
AUG	2.000 <T	1.000 <T	.	2.000 <T
SEP	BDL	BDL	.	2.000 <T
OCT	1.000 <T	BDL	.	BDL
NOV	1.000 <T	1.000 <T	.	1.000 <T
DEC	1.000 <T	1.000 <T	.	BDL
ATRAZINE (NG/L)			DET'N LIMIT = 50	GUIDELINE = 60000 (A2)
MAY	BDL	BDL	.	.
JUN	BDL	BDL	.	.
JUL	170.000 <T	150.000 <T	.	.
AUG	80.000 <T	BDL	.	.
SEP	90.000 <T	BDL	.	.
OCT	90.000 <T	80.000 <T	.	.
NOV	160.000 <T	BDL	.	.
DEC	BDL	BDL	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
PHENOLICS (UG/L	PHENOLICS)		DET'N LIMIT = .20	GUIDELINE = 2 (A4)
MAY	BDL	.400 <T	.	.
JUN	BDL	BDL	.	.
JUL	BDL	BDL	.	.
AUG	BDL	BDL	.	.
SEP	BDL	BDL	.	.
OCT	.800 <T	.800 <T	.	.
NOV	BDL	.800 <T	.	.
DEC	.600 <T	.800 <T	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
VOLATILES				
BENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
MAY	BDL	BDL	.	.100 <T
JUN	BDL	.050 <T	.	BDL
JUL	BDL	.200 <T	.	.100 <T
AUG	BDL	.100 <T	.	.100 <T
SEP	BDL	.100 <T	.	.100 <T
OCT	BDL	BDL	.	BDL
NOV	BDL	!U	.	BDL
DEC	BDL	BDL	.	BDL
TOLUENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)
MAY	BDL	.100 <T	.	.050 <T
JUN	BDL	BDL	.	BDL
JUL	BDL	.300 <T	.	.150 <T
AUG	BDL	.200 <T	.	.100 <T
SEP	BDL	.350 <T	.	.200 <T
OCT	BDL	.100 <T	.	BDL
NOV	BDL	!U	.	BDL
DEC	BDL	BDL	.	BDL
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)
MAY	BDL	BDL	.	.150 <T
JUN	BDL	.100 <T	.	.050 <T
JUL	BDL	.100 <T	.	BDL
AUG	BDL	.050 <T	.	BDL
SEP	BDL	.100 <T	.	BDL
OCT	BDL	.050 <T	.	BDL
NOV	.050 <T	!U	.	.100 <T
DEC	BDL	.050 <T	.	.100 <T
M-XYLENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)
MAY	BDL	.100 <T	.	BDL
JUN	BDL	BDL	.	BDL
JUL	BDL	.300 <T	.	BDL
AUG	BDL	.200 <T	.	BDL
SEP	BDL	.300 <T	.	.100 <T
OCT	BDL	BDL	.	BDL
NOV	BDL	!U	.	BDL
DEC	BDL	BDL	.	BDL
O-XYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	.	BDL
JUL	BDL	.150 <T	.	.050 <T
AUG	BDL	.100 <T	.	BDL
SEP	BDL	.100 <T	.	.050 <T
OCT	BDL	BDL	.	BDL
NOV	BDL	!U	.	BDL
DEC	BDL	BDL	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
STYRENE (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 100 (D1)**
MAY	BDL	BDL	.	.300 <T
JUN	BDL	.100 <T	.	.050 <T
JUL	BDL	.050 <T	.	BDL
AUG	BDL	.050 <T	.	BDL
SEP	BDL	BDL	.	BDL
OCT	BDL	BDL	.	BDL
NOV	.100 <T	IU	.	.100 <T
DEC	BDL	.050 <T	.	.100 <T
CHLOROFORM (UG/L)			**DET'N LIMIT = 0.10**	**GUIDELINE = 350 (A1+)**
MAY	BDL	20.600	.	17.000
JUN	BDL	21.100	.	16.400
JUL	BDL	24.800	.	18.500
AUG	BDL	29.000	.	22.000
SEP	BDL	22.300	.	15.900
OCT	BDL	21.700	.	14.300
NOV	BDL	IU	.	14.100
DEC	BDL	16.600	.	12.400
DICHLOROBROMOMETHANE (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 350 (A1+)**
MAY	BDL	10.950	.	10.000
JUN	BDL	11.100	.	9.750
JUL	BDL	13.400	.	11.000
AUG	BDL	14.200	.	12.300
SEP	BDL	12.650	.	10.600
OCT	BDL	11.850	.	9.400
NOV	BDL	IU	.	9.250
DEC	BDL	10.300	.	8.500
CHLORODIBROMOMETHANE (UG/L)			**DET'N LIMIT = 0.10**	**GUIDELINE = 350 (A1+)**
MAY	BDL	4.300	.	4.100
JUN	BDL	4.500	.	4.200
JUL	BDL	5.400	.	4.700
AUG	BDL	5.400	.	5.400
SEP	BDL	5.700	.	5.100
OCT	BDL	4.600	.	4.100
NOV	BDL	IU	.	4.100
DEC	BDL	3.600	.	3.400
BROMOFORM (UG/L)			**DET'N LIMIT = 0.20**	**GUIDELINE = 350 (A1+)**
MAY	BDL	.400 <T	.	.400 <T
JUN	BDL	.400 <T	.	.400 <T
JUL	BDL	.600 <T	.	.400 <T
AUG	BDL	.600 <T	.	.600 <T
SEP	BDL	.600 <T	.	.600 <T
OCT	BDL	.600 <T	.	.600 <T
NOV	BDL	IU	.	.400 <T
DEC	BDL	.400 <T	.	.400 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT COLBORNE WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
TOTL TRIHALOMETHANES (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 350 (A1)
MAY	BDL	36.500	.	31.500
JUN	BDL	37.050	.	30.750
JUL	BDL	44.200	.	34.600
AUG	BDL	49.150	.	40.300
SEP	BDL	41.300	.	32.150
OCT	BDL	38.650	.	28.350
NOV	BDL	IU	.	27.800
DEC	BDL	30.900	.	24.600

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: POCODO UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION:**NAME:** BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:
MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do not rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do not rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled
Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)

Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time of day on submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)
Volatiles (duplicate) **(OPOPUP)**	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics **(OWOC) (OAPAHX)**	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top

<u>Steps:</u>

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.